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ABSTRACT

This paper considers the relationship between bilingualism and intelligence in Puerto Rican children from a population perspective. A population perspective refers to the idea that many of the variables considered by psychologists to be independent are, in fact, distributed non-randomly in the population, and that this distribution needs to be considered as an essential aspect of the phenomenon in question. Almost 400 elementary school students in a bilingual program in New Haven, Connecticut, who were homogeneous in terms of socioeconomic status (low) and ethnicity (Puerto Rican) were tested using measures of English and Spanish ability, metalinguistic skills, and nonverbal intelligence. Results, in general, supported the position of a positive relationship between bilingualism and cognitive ability. Along with the student testing, a large-scale survey of all parents of Puerto Rican elementary school students was carried out in an attempt to gain understanding of what characteristics described the subpopulation from which the cognitive study sample was drawn, in relation to the broader Puerto Rican community. It is argued that the relationships found between demographic characteristics and language use, within both the subgroup and the larger group, highlight the importance of understanding the social environment in which bilingualism develops if questions are to be asked about its effects, and that what happens to an individual child will be a function of an interplay of influences that cut across various levels of analysis. (CMG)

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A POPULATION PERSPECTIVE ON BILINGUALISM IN PUERTO RICAN CHILDREN

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A Population Perspective on Bilingualism in Puerto Rican Children

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The question of the relationship between bilingualism and intelligence is one that has been a major concern of researchers interested in bilingualism and bilingual education. Today, we would like to discuss this question as a prototypical example of a situation in which a population perspective can be useful and important.

By a population perspective, we are simply referring to the view that many of the variables that psychologists normally consider to be independent variables are in fact distributed non-randomly in the population. This distribution of so-called independent variables in the population needs to be considered as an essential aspect of the phenomenon in question. As with many social phenomena, bilingualism occurs and takes on meaning within a social context that shapes its effects and indeed its expression within the individual. There are many variations on this theme, but today we will not give an explicit analysis of different kinds of population perspectives. Rather, what we will do is tell you about some ongoing work in the Puerto Rican community in New Haven, Connecticut that has helped us to develop our understanding of how answers to the question of bilingualism and its effects must explicitly take into account a population perspective. We consider this work to be very much work in progress. As we develop this perspective, it is leading us to reformulate the kinds of data we seek from our population as well as the way we go about asking our research questions.

The problem of bilingualism and intelligence raises at least two thorny definitional issues -- for the term "bilingualism" and for the term "intelligence". Today, we won't get into the problem of defining intelligence. For simplicity, we will use this term broadly, referring to performance on a variety of tasks ranging from standard intelligence tests to the ability to operate on linguistic form as an object -- a skill that is most commonly referred to as "metalinguistic awareness". Rather, we'll focus on bilingualism. Bilingualism has been thought of by psychologists both as an identifier of social group, and as a mental trait -- a characteristic of the individual mind. That is, is the bilingual someone who belongs to a group that happens to use two languages, or is the bilingual someone whose head contains two languages?

The research on bilingualism and intelligence has a long history, going back to the turn of the century. The early work was in the context of the turn-of-the-century debates over the intelligence of various immigrant groups to the United States. Researchers of those days -- including luminaries in the field in those days such as Lewis Terman, Florence Goodenough, George Stoddard, and Rudolph Pintner -- debated whether bilingualism was or was not a handicap in the measurement of intelligence. The hereditarians argued that bilingualism (referring to the inability of the immigrants to use English adequately) was not a handicap in test-taking, and therefore that their inferior

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performance was due to their innate genetic inferiority. However, when it became increasingly clear that the immigrants fared worst on tests that contained heavy components of English, the hereditarians were forced to admit that there was a language handicap. Florence Goodenough and others then turned the argument around, and said that the very existence of the language handicap -- their inability to learn English -- was itself the result of genetically determined, inferior intelligence. The environmentalists from the Iowa Child Welfare Research Station, on the other hand, argued that the immigrants were performing poorly because their bilingualism, an environmental condition, was causing mental confusion.

What's remarkable about this debate is that the language handicap of bilingualism, initially construed as a test-taking factor associated with a group trait, namely foreignness, soon became an alleged characteristic of bilingualism. The details of this turn of events in the study of bilingualism and intelligence can be found in a recent book by my co-author, Kenji Hakuta, appearing in the references in your handout.

The majority of recent work on the problem of bilingualism and intelligence, particularly after the revolutionary work of Elizabeth Peal and Wallace Lambert in 1962, has been geared towards a mental view of bilingualism and its effect on measures of intelligence. It is not surprising, then, that these researchers were interested in labelling as "bilingual" only those subjects who were really proficient in two languages. They condemned --for good reason-- earlier research that, for example, had used the foreignness of the last name of the children as a criterion for considering them bilingual.

With this new definition of bilingualism, suddenly, researchers were finding positive cognitive effects of bilingualism. What's important for our purposes here is that the basic thrust of these studies is to compare in as pure a way as possible, uncontaminated by socioeconomic status and other factors, bilinguals with monolinguals. Bilingualism is thought of as a mental treatment variable. The difference between a monolingual and a bilingual is that the former knows and uses one language, the latter, two. What is important about this line of work is that it cleared up some of the earlier confusion between group- and individual-based definitions of bilingualism. In the early discussions just mentioned, all the members of immigrant non-English dominant groups were considered bilingual, not just those who had mastered English. However, in these new attempts to look for the "real" effects of bilingualism, separable from social factors, bilingualism was reconceptualized as a mental trait, a trait of the individual mind, rather than as a characteristic of the group. The dimension of the amount of each language within the individual became more important than the individual's membership in a linguistic group.

In this cognitive view, the discrepancies between the positive findings of Peal and Lambert and those of other earlier work with immigrants was explained at the level of the individual's bilingualism. Jim Cummins, for example, argued in 1976 that the negative consequences would result from limited, or non-balanced bilingualism, which was in turn a result of the socio-linguistic conditions of immigrants. This

situation is referred to as subtractive bilingualism. By contrast, the positive consequences resulted from true, or balanced bilingualism, that occurred in the social milieu referred to as additive bilingualism.

What we have to say today started out as an attempt to straighten out some of the methodological wrinkles in this effort that conceptualized bilingualism as a mental trait.

As we saw it (the "we" here referring to Kenji and Rafael Diaz, now at the University of New Mexico), there were several major methodological refinements to be made on the traditional studies of bilingual-monolingual comparisons that modelled themselves after Peal and Lambert. The problem germane to our topic today is that although groups of bilinguals and monolinguals can be matched in terms of their SES, ethnicity, sex, neighborhood, or whatever might be considered confounding variables, there can always be other, unspecified factors that might make a difference on the dependent measures. For example, as MacNab pointed out in a paper published in 1979, in comparing children in different language programs, even if the two groups are matched on every conceivable demographic factor, the very fact that they or their parents chose different programs or that they were selected into them should reflect important differences.

We therefore decided to abandon the between-group comparisons, and to look within a group of children who were in the process of becoming bilingual. We chose the local bilingual education program in New Haven, a transitional program for which children are selected on the basis of their limited English proficiency and dominance in another language. The program is primarily made up of Puerto Rican children who are dominant in Spanish. They are from low SES backgrounds. For example, in our sample, only about 34 percent of the parents of the sample reported that they were employed.

In the study, we reasoned that if the claims about the relationship between bilingualism and intelligence were true, we should find it within this group that is socioeconomically and ethnically homogeneous. The more bilingual children should do better on cognitive measures than the less bilingual children -- bilingualism here was defined as relative knowledge of English and Spanish. We should also add that we followed the children longitudinally, so that we could assess direction of causality. This comparison, we felt, would be unconfounded with SES and background characteristics, or at least, not so heavily as in the between-group comparisons. Moreover, by looking within a relatively homogeneous sample, we would not be making assumptions about the relationship of demographic factors to degree of bilingualism -- indeed, bilingualism might be related to demographic variables, but we felt that this relationship could be empirically explored.

Subjects were elementary school students (grades K-6) in the Bilingual Program. Over the course of three years, a total of 392 subjects participated in the study. Subjects were tested in the fall and spring of each school year.

In the study, we included measures of English and Spanish ability, metalinguistic skills, and nonverbal intelligence.

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We analyzed the data using primarily correlational procedures. The effect of bilingualism on the dependent measures was assessed through partial correlations (the correlation between English and the dependent measures, controlling for Spanish and for Age). The effect of verbal ability in Spanish was also assessed by looking at its correlation with the dependent measures, controlling for English and Age. In both our cross-sectional and longitudinal analyses, there were statistically reliable effects of bilingualism on the dependent measures, although the magnitude of the effect and the statistical reliability varied over time and grade level. We found the most consistent relationship with bilingualism for the nonverbal measure of Raven's (our measure of bilingualism correlated up to .35 even after age was partialled out). Statistically reliable effects also appeared, although more sporadically, on metalinguistic awareness and a measure of social perspective-taking. Spanish showed its most consistent relationship with metalinguistic ability, which was expected since the measure consisted of Spanish sentences. The results, in general, support the position of a positive relationship between bilingualism and cognitive ability even in non-balanced bilinguals. It was difficult, however, to make cause-effect assessments, due to the high rate of mobility in this population.

The longitudinal aspect of the study provided solid support for the position of linguistic interdependence. Over time, there was an increasing correlation between English and Spanish, even when controlling for age. Between Kindergarten and 3rd grade, the correlation between English and Spanish went from 0 to .68

One way in which a population perspective was reflected in this study was that we looked within an ethnically and socio-economically homogeneous group in trying to uncover the "true" effects of bilingualism. This version of the population perspective simply says that we were aware enough of the distribution of bilingualism in the population in order to enable us to circumvent confounding with population variables. There is, however, a more profound aspect of a population perspective that we now turn to.

The study we just described attempted to deal with the problems involved in comparing different populations by looking within a group and assessing the relationship of a child's degree of bilingualism to her cognitive development. Given an effect of bilingualism on performance on measures of intelligence, from an individualistic perspective that conceives of bilingualism as being a purely mental characteristic, the direction to take is to do further work deciphering the mental mechanisms by which bilingualism might have had an effect on intelligence. Indeed, we do need cognitive accounts -- be they Piagetian, Vygotskyan, Chomskyan, or even Martian -- of how knowing two languages might have an effect.

From our population perspective, however, bilingualism cannot be thought of independently of the social and demographic variables with which it covaries. It is rooted in a set of social conditions that lead particular individuals to particular outcomes. Thus, the investigation of the cognitive effects of bilingualism must be accompanied by an

investigation of the parameters within which this bilingualism occurs. It is important to know what kind of bilingualism is present, and how social and demographic factors relate to its development in the group and in individuals.

To begin to gain such an understanding -- to put a frame, as it were, around the cognitive study -- we conducted a large-scale survey of parents of all elementary school Hispanic children in the New Haven Public Schools. We sent out questionnaires to the parents of all 1633 Hispanic students. We're actually proud of our response rate of approximately 72%, which gives us a picture of the full range of language vitality of both English and Spanish in the Hispanic community from which the bilingual program students are drawn.

We were mainly interested in placing the study sample of bilingual program students in the framework of the entire Hispanic population. The goal was to understand what characteristics described the sub-population from which the sample for the cognitive study was drawn, in relation to the broader Puerto Rican group in New Haven. To do this, we divided the respondents into 3 groups--children currently in the bilingual program, children who had been in the program but were not now, and children who had never been in a bilingual program. Analyses confirmed that bilingual program students were from a predictably select sector of the population, with greater orientation towards use of Spanish at home. We found a clear distinction in reported language behavior among families of children in the population as a function of the program type of the children. The families of children in the bilingual program reported using more Spanish and less English than families of children who had never been in the program. Intermediate were those whose children had been in the program in the past but no longer were. As you can see in figure 1, by looking at scatterplots of composite indices we created --based on a number of questionnaire items-- of the English and Spanish orientation in the homes, we can see the distinctions among these groups.

We have striking evidence that the bilingualism in this community is of the subtractive variety, in which more English usage is associated with less use of Spanish. One indicator of this, shown in figure 2, is the relationship of parents' length of residence in the U.S. with parents' ratings of their child's difficulty in Spanish. Parents who have been in the U.S. longer, especially those born there, report their children as having more difficulty in Spanish. There was also a moderate positive correlation of parental self-reported ability in English and child's difficulty in Spanish.

There were systematic relationships of language to other demographic characteristics within the population. For example, the neighborhoods in which our respondents lived can be categorized with respect to social desirability, and used as an index of upward social mobility. As shown in Figure 3, we found more reported use of English and less of Spanish in the more desirable neighborhoods(Fair Haven). Parents' birthplace and length of residence in the U.S. were also correlated with the vitality of English and Spanish. In one example of this, illustrated in Figure 4, there was a clear and positive relationship between length of residence in the U.S. and the number of

English books and periodicals in the home, and a negative relationship with Spanish books and periodicals. Parents who had been here longer reported, on the average, having fewer Spanish books and periodicals, but more English ones.

This subtractive situation, observed in the community at large, can also be found in our cognitive study where the subjects were all in the bilingual program. Even within this group, it turns out, demographic factors such as length of residence on the mainland, parent employment status, and amount of English at home, are systematically related to the children's abilities in English and Spanish as they enter the program. However, it is important that the program itself places the children in an additive bilingual situation -- albeit temporarily. The program for the children is, as it were, an additive bilingual oasis surrounded by the forces of subtractive bilingualism. One bit of evidence we have for this is that there is the increasing correlation between English and Spanish over time, a result that we mentioned earlier. The additiveness of the situation can be seen more directly through simple observation of the classroom activities as well as in the curriculum contents. Even as the children are adding their second language, English, reading continues to be taught primarily in Spanish, although it gets phased out over time.

More objective evidence for the additiveness of this bilingual situation can be seen in the differences in Spanish between students who were either born in Puerto Rico or in the mainland. As shown in Figure 5, in the fall semester of kindergarten, we find significant differences between the two groups of children in their Spanish vocabulary. (Figure on the right) Although the means on the Spanish measure increase for both groups, by the spring semester, there is no longer a difference between the groups, indicating that the Mainland-born group had caught up with the Puerto Rico-born group. In the first grade, we continue to find no differences between these groups in terms of Spanish. The English that these students are acquiring, then, can be seen as additive to the Spanish ability that is being maintained while the students are in the program. Nevertheless, at least for the first year, a main effect on English for child's birthplace remains, although this may wash out in later years.

The point of all this for this morning is that the relationships we found between demographic characteristics and language use highlight the importance of understanding the social environment in which bilingualism develops if we are to ask questions about its effects. What happens to an individual child will be a function of an interplay of influences that cut across various levels of analysis. In thinking about the relationship of bilingualism and cognitive ability, we would like to move towards a view that incorporates conceptions of bilingualism as an individual characteristic and as a group one, not just by "controlling" for extra-individual factors, but by exploring them as essential aspects of the picture. An analysis of population characteristics highlights the heterogeneity of ethno-linguistic communities and the way in which cognitive and linguistic variables at an individual level are associated to a variety of social factors. In our survey, we used a macro-level sociolinguistic perspective that did not investigate how factors such as length of residence get translated psychologically at the individual

level. In future investigations, we hope to look more closely at these more micro-level effects within the various population sub-groups. For example, it may well turn out that although there is a generally subtractive situation for the kinds of language uses that we have looked at -- primarily school and literacy-related measures, such as vocabulary tests and amount of literature at home -- for symbolic purposes of group identification, it may turn out that Spanish maintains a robust presence. These influences can only be observed at the micro-analysis level of the ethnography of communication in the community and of how these interactions influence the social cognition of the participants. This is the direction we intend to take in pursuit of the proper perspective on bilingualism in this community.

A POPULATION PERSPECTIVE ON BILINGUALISM
IN PUERTO RICAN CHILDREN. (SRCD 1985).

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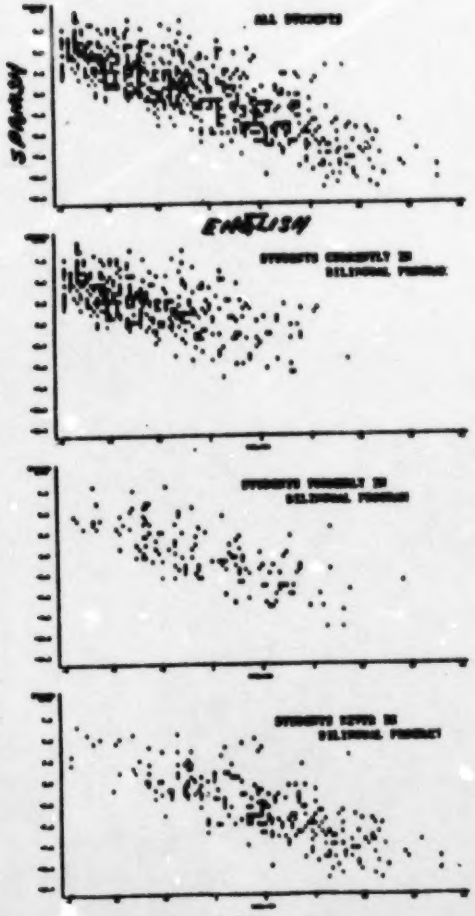


FIGURE 1.

FIGURE 2.

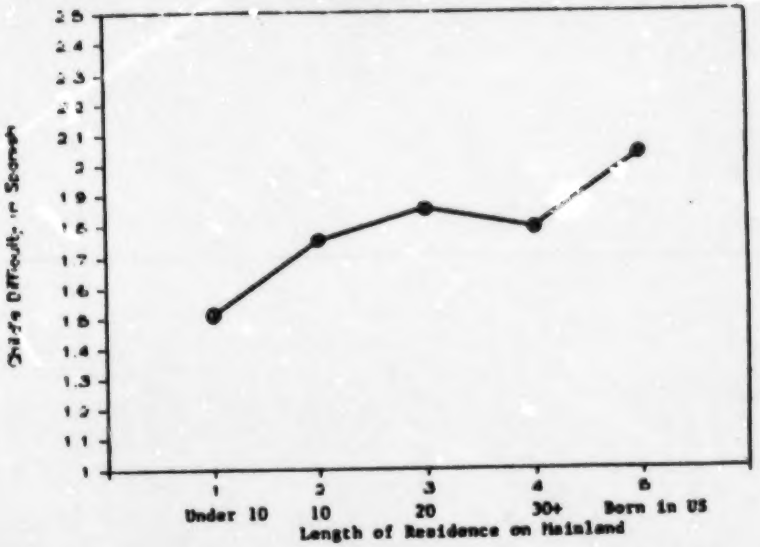
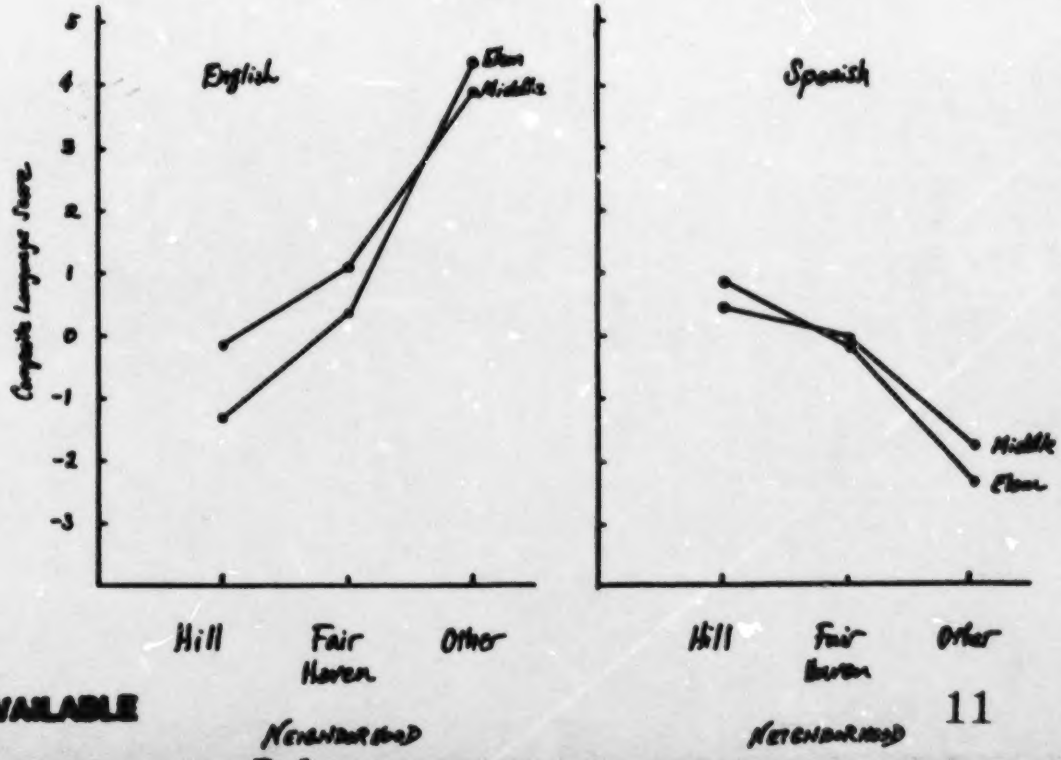


FIGURE 3.



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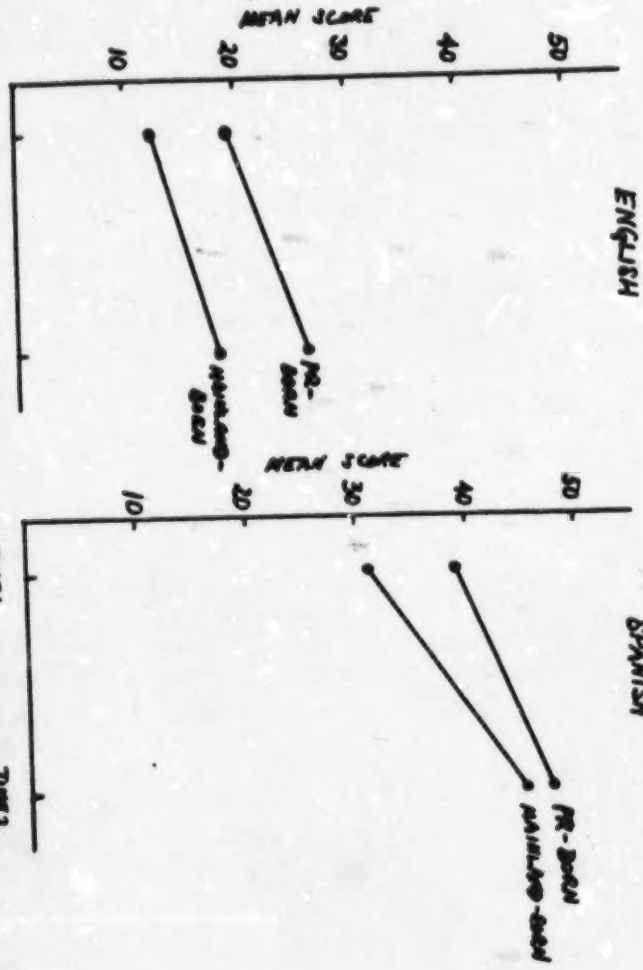
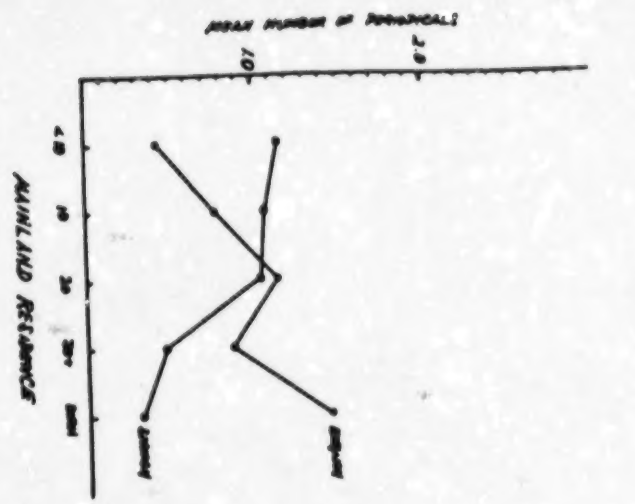


FIGURE 5.



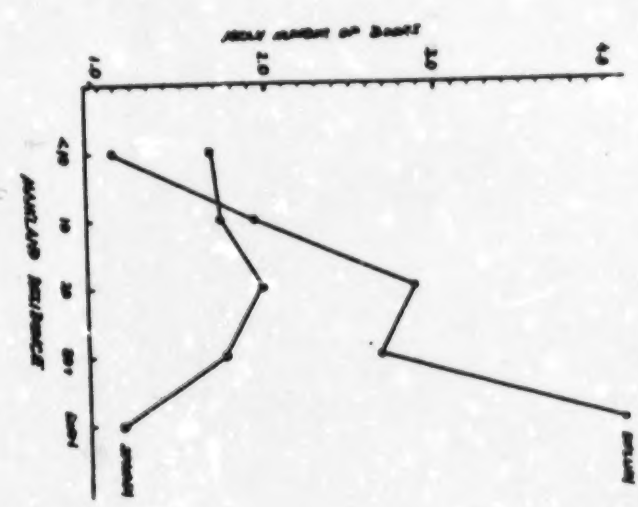


FIGURE 4.

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